DOCUMENT RESUME

ED 309 730 HE 022 704

TITLE Information Technology--Can It All Fit? Proceedings of the Current Issues Forum of the 1988 CAUSE National Conference (Nashville, Tennessee, December 2, 1988). Professional Paper Series, #2.

INSTITUTION CAUSE, Boulder, Colo.

SPONS AGENCY International Business Machines Corp., Milford, CT. Academic Information Systems.

PUB DATE 89

NOTE 27p.

AVAILABLE FROM CAUSE Publications, 737 29th Street, Boulder, CO 80303 ($16.00).

PUB TYPE Collected Works - Conference Proceedings (021)

EDRS PRICE MF01/PC02 Plus Postage.

DESCRIPTORS Centralization; Communications; Computer Uses in Education; Higher Education; Information Systems; *Information Technology; Institutional Role; Organization; Organizational Change; Telecommunications

ABSTRACT

A key issue facing college and university executives is the best way to organize to provide information services to faculty, staff, and students. Three experienced university executives addressed this issue at the forum on information technology described in this document. They looked at the following topics: how their own institution chose to organize for information technology; what factors led them to organize in this manner; their perceptions of the strengths and weaknesses of this particular choice of organization; and advice to other institutions facing a decision about how to organize for information technology. The papers are as follows: "Information Resource Management: Why Centralize?" (Paige Mulhollan); "Information Technology Management: Finding the Right Fit" (Robert Scott); and "Gaining Acceptance for an IRM Program" (Thomas W. West). A transcript of the concluding question-answer session is appended. (SM)

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The Association for the Management of Information Technology in Higher Education

Information Technology—Can It All Fit?

Proceedings of the Current Issues Forum of the 1988 CAUSE National Conference

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Foreword

"Information Technology—Can It All Fit" was the question pursued at the Current Issues Forum of the 1988 CAUSE National Conference on December 2, 1988, at the Opryland Hotel in Nashville, Tennessee, by panelists Paige Mulhollan, Robert Scott, and Thomas West. The Forum was moderated by George Carroll, Chair of the 1988 CAUSE Current Issues Committee, whose members designed the Forum in conjunction with the CAUSE88 Program Committee. This professional paper is based on a transcript of the Forum and includes in an appendix the panelists' responses to several questions from the audience.

Acknowledgment

***CAUSE** appreciates the continued generous support of IBM, who funded the publication of this professional paper (see pages 18 - 19).*

Introduction

There are approximately 3,300 colleges and universities in this country and all of them have been affected to some degree or another by what has been called the computer revolution. We are living in the post-industrial society where information reigns supreme.

Our campuses are now home to thousands of microcomputers, minicomputers, mainframes, and most recently supercomputers. This technology is having a major impact on such routine functions as mail delivery and printing and on venerable campus institutions such as the library. Campus administrators are being asked to meet computing, telecommunications, and related information services demands which often seem insatiable. The pervasiveness of information technology and the growing financial investment it requires is drawing increased attention to the subject of effective management of this valuable resource.

One key issue facing college and university executives is the best way to organize to provide information services to faculty, staff, and students. Some schools are committed to centralized Information Resource Management, or IRM, organizations while others find a decentralized or "each tub on its own bottom" approach more appropriate.

The Current Issues Forum at the 1988 CAUSE National Conference brought together three experienced university executives who were asked to address this organizational issue. A university president, a vice president for finance, and an assistant vice chancellor for computing and communications came together to address these questions:

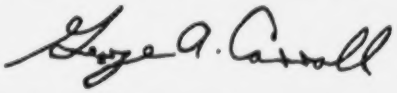
- How has your institution chosen to organize for information technology?
- What factors led you to organize in your chosen manner?
- What do you perceive to be the strengths and weaknesses of this particular choice of organization?
- What advice would you offer to other institutions facing a decision about how to organize for information technology?

It has often been said that where you stand depends upon where you sit. One would therefore expect that the three panelists brought together for the CAUSE88 Current Issues Forum would disagree on the best way to organize for information technology management.

To some extent this assumption proved to be true. President Mulhollan strongly advocated centralized management of information technology. Robert Scott discussed the factors that affect an institution's decision of how to organize and plan for information technology and how these have led to the decentralized approach employed at Harvard. Thomas West explored alternative models for information resource management, and offered advice for gaining IRM acceptance.

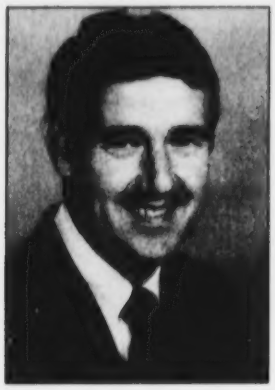
While differences were important, focusing only on them would cause us to miss the fact that these leaders agreed on the crucial themes. For their Forum presentations, they were asked to focus on organization, but of necessity they each stressed the importance of the other cornerstones of management—planning and control. They agreed that the key issues in melding information technology services on campus are not technical—they are managerial.

Can the management of information technology be consolidated? In the final analysis, the issue is not so much whether it *can* be done, but rather whether it *should* be done, depending on institutional culture, and if we have the will to do it. If these questions are being actively considered on your campus, the chances are great that many of the ideas expressed here will "fit" your needs.



George A. Carroll
Coordinator, CAUSE88 Current Issues Forum

George A. Carroll is Director of the Center for Computer and Management Services at Rutgers, The State University of New Jersey, where he is responsible for the management of the administrative computer center as well as the voice communications system for this three-campus system.



***Paige Mulhollan** became the third president of Wright State University in July of 1985, having previously served as executive vice president at Arizona State University and, before that, provost and vice provost for academic affairs at ASU. Earlier he served as the dean of Arts and Sciences and professor of history at the University of Oklahoma and as associate dean of Arts and Sciences and associate professor of history at Kansas State University. Dr. Mulhollan has been active in educational associations in the fine arts and the humanities, and has served on numerous regional and national commissions and boards. He currently serves on the CAUSE Strategic Advisory Council.*

Information Resource Management: Why Centralize?

by Paige Mulhollan

University presidents can bluff about two inches deep on any subject from anthropology to zoology, and are given to doing so rather frequently. So I want to make it clear from the beginning that I am not a technocrat; I'm a fallen historian, according to the historians, and I'm not sure where that leaves me.

I have spent twenty years in academic administration in a variety of institutions and always, and increasingly, with some responsibility for information technology management—in my last two positions, with very substantial responsibility in that area. So my views are developed out of that context and out of the type of institutions where I served.

Arizona State University, as you may know, is an enormous state university of 45,000 students and is becoming a comprehensive research institution. Wright State University, with 17,000 students, is an institution of a variety we call the "metropolitan university"—founded to serve a metropolitan area and to take an active leadership role in that area, rather than a passive and responsive one; intended to serve a non-selective but, more importantly, place-bound student body; and intended to support and encourage traditional university values, but to go beyond those and to support, appreciate, and reward values such as outreach, applied research, and professional service.

I make those observations not as an advertisement but because I think the way you choose to manage information technology has a lot to do with the type of institution in which you find yourself. Clearly, there is a vast gulf in more than one way between Harvard, from which perspective Mr. Scott will speak, and Wright State University. The Harvard tradition of "each tub on its own bottom" is totally foreign to the kind of administrative organization which is necessary and which is traditional in the institutions of the sort where I have spent my career.

Out of that experience I think I have two fundamental beliefs that are relevant to this morning's topic. The first of these is that strategic planning is a necessity for an institution if it wants to know where it's going, what it wants to be, what it's capable of being, and how it has to act if it wants to realize its goals. Almost all institutions pay lip service to strategic planning; very few actually do it, and many of those that do then forget the plan once it's complete and go back to doing business as usual. That doesn't invalidate the legitimacy, however, of the principle involved.

Now if you start from there, and if you have an appreciation for what information technology is and will be in the coming decades, I think you have to conclude, secondly, that information technology itself has to undergo a strategic planning exercise. Obviously, you do strategic

planning at the unit levels (academic units or administrative units), but I think you overlook sometimes the necessity of strategic planning for information technology in and of itself—because of its relevance to all of the institution's goals and because of the obvious cost implications of its development. This view is not new and I think it's fairly widely held.

An article in *CAUSE/EFFECT* about this time last year expressed this same view on the part of three institutional presidents who had been interviewed by the CAUSE president. You could find a number of learned quotations from outstanding presidents—Fred Davidson at the University of Georgia, for example, said one time that the three principle tasks facing university presidents were, simply: first, understanding the direction and magnitude of impending changes in the information and computing technologies; second, determining the implications of those changes for our institutions; and third, initiating and nurturing those activities that move our institutions forward in the mainstream of the information age. That's no more than a recognition that the strategic plan for information technology within the institutional plan is important enough to be separately addressed.

Now it may be that presidents or other officials (vice presidents for business, or what have you) effectively coordinated technology in a decentralized model in its early stages of development. Actually, I doubt it, and I think to check that you need simply refer to reality. The early development of information technology in higher education was almost always computing, in the first place, and it was usually left to committees, to some officer who was assigned it in addition to other duties, or to individual departments, administrative and academic. The consequences of that laissez-faire attitude, I think, are fairly well understood: mindless acquisition of computing equipment, often driven by some real or imagined crisis or by the imperialism of some computer center director—perhaps some of you who are sitting in this room.

I was at Oklahoma, for example, after they had just purchased the last tube-type computer. I know a lot about the mindless acquisition of computing equipment. Equipment was usually purchased with one-time money, with no reserve for depreciation and no consideration for what its planned lifetime might be or what you did when that ended. Little understanding existed of the personnel needed to support the development of the computing system (still probably one of the greatest problems that faces the development of technology programs in higher education), seldom any regard for the problems associated with maintenance, and most of all, maybe, in the long term, little or no consideration of how to demonstrate or even calculate the cost/benefit of whatever investments were being made in these technologies.

More recently, the continuation of a laissez-faire attitude and a decentralized approach, in my judgement, has been characterized by the absolute proliferation of micros—to an alarming extent, if you look into the financial implications. When I went to Wright State, we were supporting forty-six different kinds of microcomputers on a campus of 17,000 students. (I tried to find for this presentation how many brand names of microcomputers there are, but I'm not sure you can find that out. When you include taking generic components and putting a different name on the box, I'm confident that there are more than two hundred.)

There's just been a mushrooming of brand names and numbers, with institutions literally doubling and tripling the number of such devices in a matter of two or three years, little coordination, rarely any significant volume pricing, no inventory of software, no consistent approach to maintenance, and no standards with respect to software, peripherals, support levels, copyright, and other ethical issues. At the same time, departments have been allowed to establish minicomputers within their individual departments that frequently don't communicate with one another.

When I went to Wright State, we had an accounting system and a budget system on separate computers which were not compatible and were unable to transfer information or data back and forth. Most seriously, there was no coordination and too little thought given to the development and planning of new technologies that go beyond traditional computing—such things as instructional television, desktop publishing, various applications of local area networks, and on, and on, and on—which fall enough outside traditional computing that they are either unknown or unplanned for by the traditional organizational framework.

Now the world's not going to come to an end if we keep on doing that for a while, and we're probably *going* to keep on doing that for a while. But it's not the best way to manage. It's essentially management by the axiom "if it ain't broke, don't fix it," which I consider to be the most pernicious axiom in the English language because it's absolutely untrue. I refer you to the most recent industrial giant who proceeded on the basis of "if it ain't broke,

don't fix it," namely General Motors. If you want to end up like General Motors, then make that choice, but that will be the outcome if you follow the axiom that until a crisis occurs, until it breaks, you don't do anything about fixing it.

Given the current status of computing on many campuses, which is still, I think, chaotic, and the increasing technological complexity of the available systems, it seems to me that, even if effective presidential or other kind of senior officer control were ever possible, it's not possible today. And yet at the same time, because of cost constraints or other considerations, and the increasing relevance of technological needs to higher education, our boards of control—our legislatures, our faculty, our students, our parents, the employers of our students—are all asking us the question that's the title of this forum today: "Can It All Fit?"

It's a nice word—*it*. I-T. Can Information Technology all fit? And it's important to answer, even though I think you have to consider a lot of alternative questions in order to get to some kind of answer. And that's what I'm going to spend a little time doing now.

First, I think you have to define information technology; then you have to examine the strategic direction of the campus on which you're working; and, finally, you make your determination of what the management structure for its effective deployment of operation might be.

First of all, let's look at a definition just very briefly. There's not any fixed definition of what falls within information technology. Different institutions have different capabilities, but I think you start with the assumption that maximum utility from information activities will be gained from the broadest definition, and then you look for those functions which can be seen to have a related purpose, and you try to put them together. The functions defined in Table 1 happen to be the ones that we've put together at Wright State University. At many other institutions where I've served it would be different, but what we've tried to do at Wright State is put into one administrative organization all of those areas which have responsibility for transferring information.

Table 1 **Define Information Technology Functions**

Administrative Computing	Printing & Mail
Academic Computing	Graphics & Publications
Telephone Services	Audio Visual Services
Data Communications	Institutional Research
Television Services	Planning

Now there's one major piece missing—where's the library? I think there's a real question as to the location of the library. There are some institutions which have bridged the gap between the library and other information technologies, such as Columbia, Cal State/Chico, Virginia Tech, and other places—perhaps where there was an outstanding librarian who was able to absorb the computing culture, rather than the contrary. At some point in the future I think that will happen. It hasn't happened at Wright State yet, but it could develop that way. Our Information Resources Management organization does run the library's system, but not the library itself. One of the great trends of the next decade is going to be statewide library access systems. And when they start moving in that direction, as they already have in Illinois and California, and perhaps elsewhere, we're going to see even more drive to put the library function and the information function in some sort of package that allows effective coordination.

Table 2 **Institutional Strategic Direction**

- Is the campus "technology oriented"?
- How much should IT support instruction?
- Student expectations
- Societal pressure for state-of-the-art programs
- Other external factors
- Other internal factors

After you've looked at the definition—and, once again, there's no one "right" answer—then you look at strategic direction (see Table 2). Each campus has to decide how technology oriented its programs are and how much it wants them to be before deciding what kind of information technology management is appropriate. And the answer, in fact, is not always quite obvious.

Clearly, if you're a research institution you have a high need for technology applications in a lot of areas. It may seem inappropriate for small liberal arts colleges, and yet there can be an argument made, it seems to me, that those liberal arts colleges who wish to do so could utilize the information technologies in an instructional way, in such a way as to establish a very clear competitive advantage which would be very important to them. So no institution, I think, can start out with the assumption that it's not going to play in this game, that it's going to be a low-tech place, that it's going to avoid the kinds of questions and problems and expenses that grow out of addressing the needs of information technology.

Once you have looked at these questions you're going to find that there are demands from outside the institution in the form of students and, increasingly, in the form of pressure from society. Whether it's legislature or business or other external forces, all of these trends have to be assessed before you know where it is you're going to go and how information technology fits in with the overall institutional priorities which are the result of a conscious plan. Regardless of where you come out on that, finally you have to put it all together and say: "How are we going to organize? How are we going to manage this technology on which we spend such a sizable percentage of our institutional revenue?"

There's been a very unfortunate use, I think, of the term "information czar." I don't know why that happened. We routinely assign all of the academic units to the academic vice president and nobody talks about the "academic czar." But somehow or other when you assign all information functions to a single manager, that position becomes the czar, and you paint pictures of potential autocracy and other unfortunate outcomes.

The management of technology centrally does not mean that all decision making is centralized, nor does it mean that all equipment is centralized, although some of it may be. It definitely does not mean that there is some autocratic force which makes all final decisions and is essentially an unchallenged source of all wisdom with respect to information technologies. The reasons for centralizing, it seems to me, are compelling.

First of all, I believe it's true that the only way effectively to implement the strategic plan for information technology is through centralized management. It may be possible to do the planning in a decentralized model, that is, it may be possible to use decentralized units, to use people whose jobs involve other things—in other words, to use a non-professional information manager to do the planning. But I would suggest that implementing the plan across an institution without centralized management becomes practically impossible. There are just too many loci of power and control to make certain that anything actually gets done.

Table 3

Why Centralize Information Technology Management?

1. Only way to implement effectively the strategic plan for IT
2. Only way to assess realistically cost/benefits in relation to university strategic goals
3. Only way to establish institutional priorities and funding alternatives
4. Only sensible way to plan for operations cost and maintenance
5. Only way to "position" institution for changing technology
6. Best way to avoid absence of demand-pull
7. Best way to determine trade-off between/among technologies
8. Best way to protect existing investment in technology
9. Only way to coordinate usage
   - —Set standards
   - —Enforce copyrights
   - —Ensure appropriate training
   - —Negotiate licenses

The planning for IT, incidentally, has to be a half-step behind that for the rest of the campus if you want to prevent the information technology planners from driving the academic units. It should be the other way around: start with the academic units, and pace the information technology planning enough behind that it can remain user driven.

Second, I believe centralized management is the only way to assess realistically the cost/benefits in relation to the university's overall strategic goals. This is going back to my earlier point that we've done very little in information technology to develop productivity measures which are widely shared or anything systematic to try to demonstrate cost/benefit and thus cost justification. I think it's going to be increasingly necessary that we do that because legislatures and others are increasingly unwilling to accept very expensive purchases on faith; as a result

they're going to seek more and more a demonstration that it's worth the investment.

I think the rest of the nine reasons shown in Table 3 are pretty much self-evident. I believe centralizing the management of information technology is the only way to establish institutional priorities as opposed to unit priorities. It's the only sensible way to plan for operations cost and maintenance, the only way to position the institution institution-wide to changing technology.

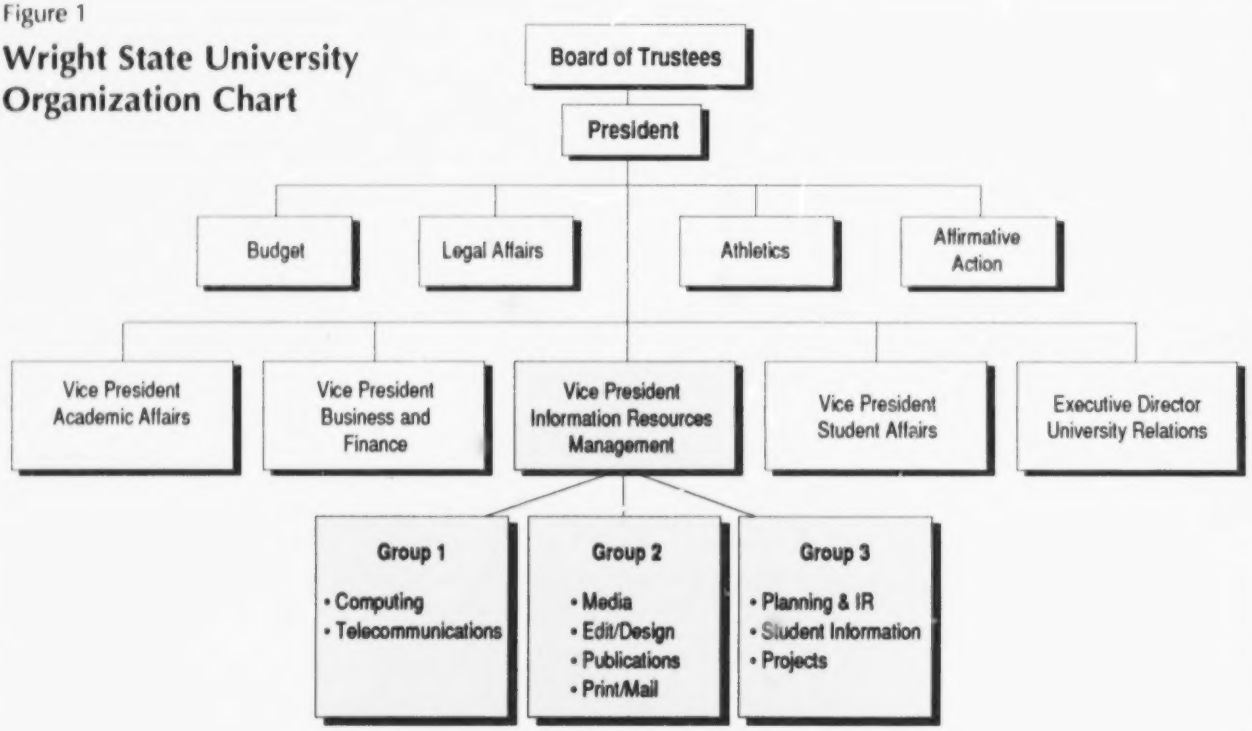
I believe it's the best way to avoid the absence of demand-pull. That's an interesting one and, I hope, a diminishing problem, but in virtually all instances, there is no ground swell of opinion among the academic community to spend a lot of money on computing, short of a crisis. In other words, some leader has got to get out in front and anticipate need, project demand, and bring about the resources to provide for it before it emerges. And that person is never going to be responding to a ground swell of popular public opinion that the most important thing to do with the next institutional dollar is to buy the next generation of hardware or technology.

A centralized office with a high ranking official is in a good position, if the leader is appropriate, to do that. What's the best way to determine trade-off between or among technologies? What does the institution do, buy two more micro labs for students or install instructional television fixed service? Do you have to let any individual unit in the university decide that? I think not, if you are following genuine institutional priorities.

I believe centralized management is the best way to protect existing investment in technology—such things as scheduling rollovers of one machine which may perhaps be adequate today for one unit, adequate tomorrow for another unit, before it loses its useful life—ensuring compatibility and other means of preserving your existing investment.

Figure 1

Wright State University Organization Chart



Information Resources Management Organization

And, finally, centralizing the organization is the only way to coordinate usage in such areas as standards, copyrights, appropriate training, licensing, and volume discounts. I could probably name another dozen things, but those are just suggestive of the areas in which I think centralized management has to take place.

Coordinating management can take place through a variety of organizations. The way we are organized at Wright State (see Figure 1) is only one model, and the particular model is not critical. *The critical thing is that any information resources management organization has to work in harmony with the entire campus community if it's going to succeed.* And there's a considerable amount of work that has to be done by the institutional leadership in order to get buy-in from all the necessary constituencies. This is not just PR, but genuine education of users and training about how to understand, use, and access the services that a central organization can provide. The campus has to be made to see that the central organization is providing some added value because if it doesn't believe that, it will simply consider it another unnecessary layer of overhead which will be opposed and resisted at every step of the way. In other words, if it's going to be accepted on campus, an information resources management organization has got to, in fact, be able to deliver services better, faster, and cheaper than any other reasonable organization.

Note, again, that centralized organization structures do not assume that the technology itself is centralized. For instance, in our organization there is no suggestion and no practice that departments may not have their own departmental machine (which many do), or that offices may not have their own office automation systems, such as local area networks, or that colleges may not have their own micro laboratories located in their own facilities (which they do). In fact, the colleges may do some of their own television production; individuals, obviously, have their own desktop publishing stations and many other individual devices which they operate within their own judgements. But the integration of these technologies, and the utilization of these technologies to accomplish institutional goals, remains within the function of the centralized management.

Take as just one very obvious and increasingly important example: desktop publishing. A final publication that goes out from a university, with the university's name and reflecting in all ways upon the university as a whole, can be generated now by a user of a PC anywhere within the institution, shipped via campus network to a sophisticated typesetting machine, maybe sent to a professional editor/designer along the way, and ultimately to a high-quality printing operation. These functions at most institutions occur in three or four different organizations and, unless there's some coordination, you're terribly likely to send publications off campus in a variety of ways that are not subject to any set of standards and which may, in fact, commit the university to liabilities that have not been considered by central management or other appropriate officials within the university.

Can it all fit? I think it's the role of responsible management, presidents, and boards, to *make* it fit. As systems proliferate, as technologies change and interrelate, I believe that the laissez-faire policy which characterized the first twenty years of sophisticated information technology development is no longer adequate to the task. I believe that centralized management can remain user driven and responsive while at the same time promoting institutional goals in a cost-effective way that conserves resources and positions institutions to accommodate growing demand and technological change. But most of all I believe that institutional leadership must make a conscious choice about whether it's going to manage these resources for the benefit of institutional goals.

At the current level of expenditures, in most of our institutions, for technology and information of various kinds, we simply cannot hide from the question any longer of how we're going to justify and continue to position ourselves for the next decade. The only question that remains is whether our decisions are conscious and strategic or whether we allow them to remain unconscious and left to the whims of chance.

***Robert Scott** is vice president for finance at Harvard University, where he is responsible for the University's activities in financial planning and budgeting, financial operations, human resources, and technology. Previously, he served as Harvard's vice president for administration and director of financial systems. Mr. Scott's interests include all aspects of management of higher education, with particular emphasis on long-term planning and on finance. He has lectured and consulted widely on the management of technologies within complex organizations, and served for eight years on the EDUCOM Board of Trustees.*

Information Technology Management: Finding the *Right* Fit

by Robert Scott

Since I agree with a great deal of what Dr. Mulhollan has said, the focus of my remarks today is not on the importance of technology to higher education or on the importance of planning. I take both as given. Rather I will focus on the different ways in which institutions can plan for technology and the importance of making the planning process fit into the institution's structure. Plans are not abstract, but are developed by people. Consequently, they reflect the wisdom and knowledge of their authors and the style of the organization which the authors represent and in which they work. Plans also reflect all that has gone before—both good and bad.

As I was travelling from the airport to the hotel last night, the driver of my car told me he had just heard an interesting story about several university officials who had passed away at the same time, and had arrived together at the judgement throne. One of them had been an associate provost for academic computing, another had been a deputy vice president for administrative systems, and a third had been chief information officer and vice president for everything of importance to the future of his university. To the first God said: "My son, what have you done to deserve entry into paradise?" The associate provost for academic computing then replied, "I protected academic initiatives, assured that we could change systems frequently, and allocated resources whenever needed to the academic computing program." To that God said, "Indeed you did, my son. Enter and sit on my left-hand side." Then God posed the same question to the deputy vice president for administrative systems, who replied, "I preserved technological stability at my university, assured that the institution's paychecks and administrative systems were produced on time, and avoided all of the problems which arise when academic and business systems are allowed to overlap." God said, "Indeed you did, my son. You, too, may enter and sit on my right-hand side." Then God turned to the person who had served as Chief Information Officer and vice president for everything of importance to the future of his university and asked him the same question. The vice president shook his finger at God and said, "First, I am not your son! Second, get out of my chair!" We all recognize the three types of people and the organizations which they represent. It is not so much that one is right and the others are wrong, but that the institution needs to *decide* what course to follow and to organize for success.

Essentially all universities make some use of information technology. Consequently, the question "Can it all fit?" has been asked almost everywhere and has been answered in one way or another by most institutions. The way in which the balance has been drawn at each school depends on how that institution makes choices between technological services and other services, on how it decided to encourage the use of technology to improve

quality and productivity, and on the dimensions it selects for control.

Most large universities are entrepreneurial in character and are able to adapt quite quickly to new situations. Success in rapidly growing and changing fields requires such nimbleness. All, however, must make resource allocation decisions. No part of any university thinks that it has all the resources it needs. All parts of all universities believe, to one extent or another, that what they are doing is being done on a shoestring and that they have, indeed, worked to "make things fit." Most institutions can also talk about the "all" side of the question. All major units of universities know that there is much that they would like to do but which they cannot afford.

Questions such as these are questions of planning and management—defining the objective, and then figuring out how to get from where you are today to where you want to be tomorrow. Planning involves deciding what you want to do, organizing to achieve the goal, measuring progress, and then modifying either the goal or activity in order to bring the two into balance. Each institution comes to its decision in its own way and so as to reflect its style and traditions.

Universities are quite good at talking about their objectives. They are not nearly as good at establishing specific goals or at organizing to achieve them. They are singularly bad at evaluating their own performance, primarily because performance measures in education are notoriously elusive. Institutions talk a lot about excellence, about program richness, about comprehensiveness, and about advancement. Universities can usually tell if they are moving in the right direction. They can rarely tell how far they want to move, how far is far enough, or when the law of diminishing returns will begin to apply. We have very few ways to decide exactly how good we should be. This state of affairs assures that we will have a lot of discussions on how to make things fit into constrained budgets because criteria are unclear.

Universities are among the most complex and most enduring organizations of Western society. While I was not here at the beginning of this conference to hear Joe Wyatt introduce the meeting, I do know from reading the reprint of his speech this morning that this is something he also believes very strongly. Universities are complex. Management of technology is complex. When the two come together, the result is doubly complex. However, just as one must manage information technology in any institution—regardless of whether it is a university, a bank, or a manufacturer—in a way that respects that institution's style, so too a university must draw a balance between this field, which changes rapidly, and several others in which time constants are much longer.

What are the problems?

First, universities are rarely hierarchic organizations. They do not have a single source of authority. The president is *a* decision maker, and a major one; the president is rarely *the* decision maker. Presidents and boards identify and make major decisions, but there are many other sources of authority in academia. Faculties decide what should be taught and individual professors decide what research is to be pursued. While presidents and boards have considerable influence on what fields an institution should enter and on the scale of activities, they are singularly uninvolved in the details of what is taught in the classroom and of how that teaching is to proceed. The principles of academic freedom, in fact, suggest that they should not be involved in such matters. Administrations can lead, support, encourage, and suggest. They cannot always decide. Since so much of what an institution decides to do in the field of technology will reflect the union of many faculty initiatives developed over time, clear long-term plans are hard to make and meet.

Second, research is largely a faculty issue. Again, while trustees and administrations may set or influence scope and scale, the details of how technology will be best used to support the advancement of a particular academic field will be determined largely by people other than administrators. Resource allocation decisions tend to be made at the local level and service to individual research projects is important.

Third, the discipline-based organization of academic institutions is important, complex, and resistant to change. Regardless of whether an institution's organization appears to be a centralized or decentralized one, decentralization is key to academic life. It is hard to change such an organization quickly and it will be hard to make changes that really matter in a totally top-down way.

Fourth, university cultures also depend to a certain extent on size. Harvard's annual operating budget approaches a billion dollars and we are involved in many of the areas of research and teaching conducted at the University level. Although we have no hospital, we have a large medical school, ten major academic programs, 17,000 students, 12,000 employees, and a community of some

40,000 people. An institution of this size is quite different from a small college and cannot be managed in the same way. Decentralization may make it easier for us to manage our future and to change, but size will make change harder to achieve.

Institutions which seem similar from the outside can in fact be quite different when seen from the inside. Princeton—like Harvard, an Ivy League institution—has an undergraduate program quite similar to ours. Princeton, however, is a much smaller institution. It has no medical, law, or business schools. The scope of its auxiliary activities is much smaller than is ours. Its management reflects this difference.

Fifth, some differences between institutions reflect differences in their governance. Public institutions, for example, may seek to control a different set of activities or to manage certain items more precisely than private institutions. Large, multi-campus organizations will reflect local differences and such organizations can reasonably concentrate on only a small number of university-wide policies or objectives.

In summary, there are significant issues for information technology planning that flow from institutional size, governance, organization, and character.

Dr. Mulhollan makes the point that the only way to implement a plan for information technology is to manage toward that result from the center. This action focuses attention on the importance of achieving change and encourages planning which is consistent with the desired change. However, the central management which is so necessary in a small or medium-sized institution must operate at a somewhat different level of abstraction in a larger university. Management of large organizations must establish objectives, ask for plans, evaluate progress, and make corrections where needed. Senior managers cannot do the job themselves but must function through an organization. Consequently, the decision of what to centralize and what to decentralize is one of the most important decisions an institution makes.

Let me illustrate with a few examples taken from my own institution. At Harvard, we control our planning and implementation for technology in the same way that we control our planning for other activities. We have a strong planning and long-term budget system at Harvard, but we do not try to control detailed decisions. Rather, we have consciously decided that an institution of our size and diversity must both permit and encourage initiative in the various academic and administrative units because such initiative is required if we are to be fast on our feet. Harvard has approximately forty budget units ranging in annual budget size from $1 million to $300 million. Each of these units is managed by a person who is clearly responsible for its academic and financial results. Choosing these units is an important decision. We select for separate attention those that are important to our academic program (i.e., schools) or those which, for one reason or another, the Board and the administration believe worthy of concentrated attention. We change the number and the detail from time to time by dividing or combining units.

The Board asks the management of each unit to do three things: prepare a long-term plan for the enterprise which discusses where the unit wants to be in five or ten years and what resources it will need to achieve that plan; develop a particular plan for the next year indicating the eight or ten major initiatives that will be addressed, their expected cost and benefit, and the actions to be taken to assure that the unit's finances are kept in balance; and operate during each year within both the rules established by the University and the constraints represented in the plan.

The Board does not second guess decisions made by departments. This system leads to great flexibility for the units but also means that there will be significant differences in the ways departments make choices and balance issues of importance: some spend much more on faculty support than others; some focus on one item, such as technology, while others emphasize different aspects of their program.

Supporting the activities of the academic departments are a number of administrative units which provide services to the University community. The Office for Information Technology is one of these administrative units and its services complement computing facilities provided locally by individual departments. These administrative units charge for their services and balance their budgets with the revenue they collect. Administrative services are not subsidized and we do not budget for them directly; rather, we budget for our main academic outputs and derive the amount of administrative service we need from the plans of those academic units.

One question one can immediately ask is: "With such a structure, how do you assure strength in an important field such as technology?" The answer lies in our central

planning system. We select the five to ten items of greatest importance to our future and ask the departments to plan for them specifically. Each unit describes, for example, how it will make use of technology and what role it expects technology to play in its future. We then provide support for the implementation of these plans through our administrative units and we work hard to evaluate results and encourage stronger performance where stronger performance is needed.

How do we help departments to plan for technology and "to make it all fit"?

First, we provide leadership.

Second, we develop standards where standards are needed. We have several in the area of information technology and are developing more.

Third, we provide a good physical communications network to support the University's activities in the field, from telephone and FAX service to television and high-speed data communications.

Fourth, we provide products. We have a large unit to acquire, market, and repair equipment and software for members of the community. Not all products are acquired from this unit but a large fraction of the equipment used by the community comes through this source. Consequently, significant standardizations result.

Fifth, we provide a wide range of traditional information system services, ranging from systems design to computer systems operation, to programming, and so forth. Much, however, is also provided by departments themselves based on need, scale, and choice.

This process is all coordinated by our planning system under which the departments set priorities and the Board accepts or rejects the levels of effect they propose. The Board asks our Office for Information Technology to evaluate these plans and to recommend change where needed. The information technology unit highlights the few departments where the greatest opportunities exist and the University concentrates its efforts in those areas.

While Harvard does not see itself as a "technologically intensive" institution, our use of technology is surprisingly intensive. Our spending for computing and library services is high relative to that of institutions with our range of programs. We spend approximately 6 percent of our budget on information services activities and approximately 3 percent on library activities. The total, or just under *one-tenth* of our budget, is a relatively large number.

Our computer store sells over 4,000 computers annually which makes it one of the largest such operations at any university. Over half of the members of our community have a personal computer and we estimate that between two-thirds and three-quarters have a very ready access to such facilities. We have become quite technologically intensive, i.e., we have "made it fit."

Our objective is to use technology well but to concentrate effort on encouraging faculty to do what we as an institution do well—teaching and scholarship. We do not aspire to be leaders in the development of new computer techniques, although we expect individual examples to develop from time to time. What we do hope to be are leaders in the use of computing technology in the teaching process.

As you can see, we do not have an information technology czar at Harvard. Dr. Mulhollan asked why anyone ever thought of using that title. I suspect that the answer comes not from the power of such an official, but rather from the likelihood that he—or she—would be assassinated!

***Thomas W. West** is assistant vice chancellor for computing and communications resources for the nineteen campuses of The California State University System. He is responsible for the overall strategic planning, coordination, implementation, and management of the information resource management program, including academic computing, administrative computing, telecommunications, and the library. Prior to going to CSU Dr. West was university director of information and computer services at Indiana University. He has served on both the CAUSE Board of Directors and the EDUCOM Board of Trustees.*

Gaining Acceptance for an IRM Program

by Thomas W. West

Information technology—can it all fit? The technological answer is definitely yes; the more important question is, do institutions have the will to make it all fit? Here one is less confident in giving a "yes" answer.

Whether it can all fit depends on institutional change, and there are two ingredients for successful change. First, there must be a high quality solution, and second, there must be organizational acceptance of the solution.

With the digitization of information, whether it be data, text, video, graphics, or voice, the technology solution is, or soon will be, at hand. Unfortunately, many institutions suffer from decision-making inertia, organizational hardening of the categories, and tunnel-vision managers who are unable or unwilling to capitalize on these technological opportunities. Thus, overcoming these barriers to gain organizational acceptance is the keystone to being able to say, "Yes, it can all fit."

The resources and services associated with information technology should be treated in the context of an information resources management (IRM) program. An IRM program should be viewed as analogous to the academic, student services, and financial management programs of the institutions.

In gaining organizational acceptance of an IRM program seven elements need to be addressed:

- defining the scope of the IRM program
- articulating common goals
- formulating a shared vision
- developing a framework for planning
- forecasting the resource requirements
- choosing priorities; and
- deciding on a management style.

Defining the scope

The first element in gaining organizational acceptance is to analyze and decide which information technology functions to include within the IRM program for both strategic planning and operational/management purposes, and which ones to include only for strategic planning purposes. An IRM program could include the following functions: academic computing, administrative systems, telecommunications (voice, video, and data), library, media services, mail, reprographics, and institutional research. Each institution's culture and management style will determine which functions are to be included and how they are to be organized.

Today, from the perspective of strategic planning, academic computing, administrative systems, and telecommunications should be included in the IRM program for both strategic planning and operation/management pur-

poses. Each institution should decide which of the other information technology functions should be included for strategic planning and operation/management purposes, or for strategic planning purposes only.

There are at least three criteria for deciding the scope of an IRM program for your institution. First, you need to determine the impact each information technology function will have on the institution's programs and the achievement of its mission. Second, you have to assess the quality of the personnel available to provide the leadership and to execute the information resources plan. Third—one that is very apparent to everybody—you need to have and allocate the necessary resources to execute the IRM program.

Articulating common goals

The second element in gaining organizational acceptance is to articulate a set of goals for the IRM program. At the CAUSE87 Current Issues Forum, Ken King, EDUCOM President, and Bob Heterick, Vice President for Information Systems at Virginia Tech, both offered a new model for approaching the IRM program. Bob referred to it as the Copernican model, the user-centered model for planning, managing, and operating the information technology functions of an institution. He called on us to throw away the Ptolemaic model, one which had technology as the center of planning and management. The user-centered model suggests there is at least one overarching goal for the IRM program, namely to increase the effectiveness of our students as learners and clients; our faculty as teachers, researchers, advisors, and self-help knowledge workers; and our administrative staff as support personnel and decision makers. Thus, as information resources professionals, whether you're a planner, a manager, a librarian, an analyst, or a technician, you should view your role as one of assisting the students, faculty, and staff in becoming more effective in their multiple roles. In essence, the IRM program of each institution should view the user as the focal point of all the planning, management, and operations.

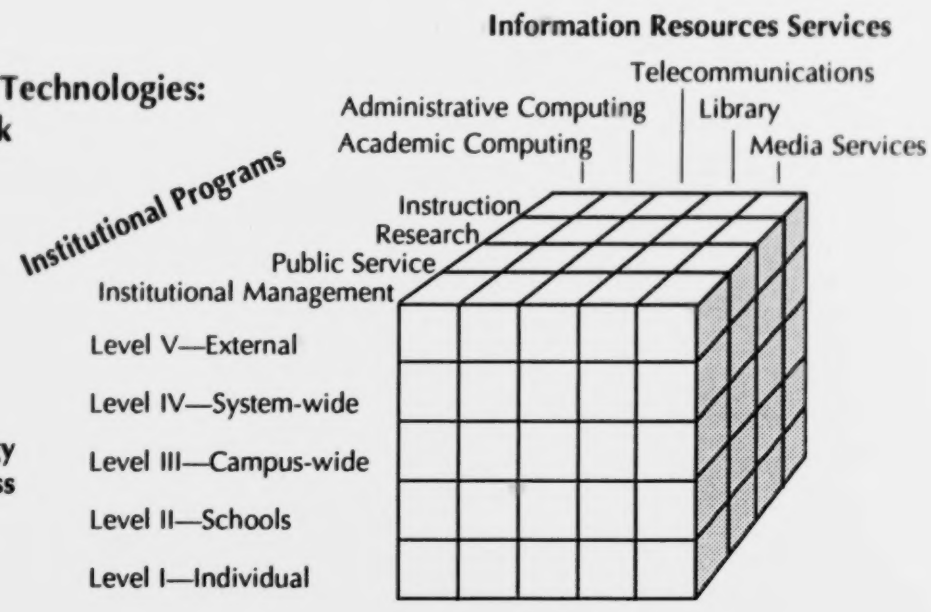
Formulating a shared vision

A third element in gaining organizational acceptance involves developing a shared vision, or what you might call strategic objectives, or target environments. A wise man once said, "Our plans miscarry because they have no aim. When a man does not know what harbor he is making for, no wind is the right wind." These words, uttered by Seneca about 40 A.D., have significant relevance as we chart the course of our IRM programs through the turbulent sea of technological changes and opportunities in this information society.

Whatever your vision, one strategic objective should be aimed at providing the appropriate infusion of information technology resources into your instructional, research, and administrative programs. And another strate-

Figure 1

Information Technologies: A Framework



gic objective should be aimed at providing your students, faculty, and staff with universal connectivity to the vast array of information and knowledge bases on and off campus. Without these two strategic objectives, I fear your institution will atrophy as we progress deeper into the "Information Age."

Developing a planning framework

A fourth element calls for developing a planning framework, what I call a single lens through which all the institutional participants should view and treat the IRM program. Might I suggest a three-dimensional framework which includes the programs served, the technology functions offered, and the levels of access at which the various information resources are available. Figure 1 depicts this framework.

The first component in this framework consists of the broad categories of programs served: instruction, research, public service, and institution management.

The second component involves stating those information technology functions you have chosen to include as part of the IRM program.

The third component involves the levels of access. Level I is the individual level. At this level faculty, students, and staff have personal computers, books, calculators, cameras, televisions, etc. Level II is the department or school which is characterized by specialized minicomputers and school libraries. Level III, the most traditional level of access for information resources, is exemplified by the computing center, the library, and the media center. Increasingly, a Level IV access is coming into play. This level involves access to external resources such as access to OCLC, supercomputers, and networks.

For those of us with multi-campus systems, there's another level, one that sandwiches between Levels III and IV. At this level we create system-wide specialty centers where individual campuses cannot afford to provide the resources.

Forecasting the resource requirements

The fifth element in gaining organizational acceptance involves forecasting the resource requirements. Utilizing this framework you can plan and forecast your resource requirements for the various information technology functions within the appropriate program areas. In addition, you can decide what information resources you're going to provide at which levels of access. These resource requirements are in the form of applications and services, technology, and personnel. By plotting out these resource requirements, opportunities become available for sharing or reducing duplication.

For instance, a few years ago The California State University (CSU) developed a comprehensive plan called the Administrative Information Management Systems plan, designed to improve institutional management and operations of the nineteen campuses and system. The resource requirements—the software, hardware, and personnel needed to attain the target environment—were forecasted using an appropriate conceptual model. Likewise, we have used similar approaches in developing the resource requirements for student access to computing and for faculty access to computing. In fact, I can tell you that the CSU needs 22,422 student workstations to meet our academic program needs, based on standards we developed for the twenty-two academic disciplines that cut across the CSU.

Choosing priorities

A sixth element in gaining acceptance involves choosing priorities and focus. At different times in the evolution of an institution, the IRM program must give focus to different information technology functions. Over the historical horizon, mail services and libraries probably have the longest terms of service in higher education, followed by telephone services. In the 1950s media, institutional research, and reprographics emerged; the 1960s saw the advent of academic computing, administrative systems, and video; the 1970s brought data communications. When we hit the 1980s we were confronted with the convergence of technologies and decentralization of the information resources across organizations.

It is my observation that given the current status of the "Information Age," the key information technology function to be developed is telecommunications, on an intra-campus and an inter-campus basis. At the CSU, to achieve the strategic objective of universal connectivity, we have launched several strategic initiatives. On an intra-campus basis, for each CSU campus we're trying to develop a telecommunications utility, one driven by the acquisition of a PBX that provides the infrastructure for data and voice communications and, where we can afford it, video. A second strategic initiative involves data cabling to provide local area networks and to fill out the campus-wide network where the first initiative was not able to do it for economic reasons. Finally, we have instituted a strategic initiative to develop intelligent buildings. We have established standards for wiring all our buildings. All new buildings that come on line will be

intelligently wired, and all major reconstruction will be intelligently wired. The capital cost of this initiative is incorporated into the capital cost calculation.

On the inter-campus basis, we have created CSUNET, which provides access and linkages among the nineteen institutions. We are working very closely with the University of California to link our two networks (in fact, we have that linkage). We've just initiated activities to work with the California Community College System to extend CSUNET to the 107 community colleges. We are participating in the National Research Education Network activities of EDUCOM. Historically OCLC provides linkage for our campuses, on an inter-campus basis, to external resources.

Deciding on a management style

The final element deals with establishing an appropriate organizational model. There are six general organizational models that could be employed for an IRM program. In my judgement there are four that are viable and two that are not. I think you can have centralized strategic planning—and I don't mean only that one person does the planning, but that it's highly coordinated in a centralized fashion—coupled with centralized operations and management. A second model can be centralized strategic planning and decentralized operation and management. The third one is centralized strategic planning and a combination of decentralization and centralization in the operations and management. The converse is also true: decentralized strategic planning with decentralized organization and management. (I think the only institutions that can do this are those that have unlimited wealth).

The models that I have determined are *not* valid are decentralized strategic planning and centralized operation and management, and decentralized strategic planning and the combination of centralized and decentralized operations and management.

There are six key factors in designing an organization for IRM:

First, the institution's mission really determines the importance of the IRM program within the institution, and specifies which information technology functions are included. For example, St. John's College in Maryland has an emphasis in their academic curriculum on the "Great Books." It seems to me that the most important information technology function at St. John's would be the library. In contrast, some high technology institution would certainly emphasize computing and telecommunications.

Second, culture and tradition are key determinants. Some institutions are confederations, some are federations, and some are city-states.

Third, the wealth quotient is very important. A small institution that does not have wealth doesn't have a lot of choice—highly centralized strategic planning with highly centralized operations and management, or highly centralized strategic planning and highly decentralized operations and management are the only usable models. In the latter model the individuals take care of themselves.

Fourth, executive leadership is a key factor. That has been demonstrated by the speakers who preceded me. The decision-making style of the institution's leadership needs to be mirrored in the IRM decision-making processes.

Fifth, the personalities, and *sixth,* the stages of development of the IRM are also factors in determining the best organizational model.

That is a brief overview of what I believe to be the seven key elements in gaining organizational acceptance and in enabling an institution to say, "Yes, it does all fit."

As an epilogue, let me share with you my view of an ideal organizational design for an IRM Program in which there is centralized strategic planning and centralized operations and management. I do not necessarily subscribe to this model in its entirety, but a former colleague recently described me as a natural born combiner, while most people are splitters, a characterization I cannot deny. My inclinations are towards selected synthesis, creating an organic organization that looks at the individual needs in a wholistic fashion.

At the outset of this presentation, I raised concerns about the will of information resources professionals and their institutions to make it all fit. Fortunately, there is a small but growing number of our colleagues who have exhibited the will and are pushing the edge of the envelope, to use the analogy from "Top Gun." I invite each of you to join that group. While the risks are great, the ride is exhilarating. It can all fit if you want to make it all fit. Let's make it happen at each of our institutions by the beginning of the twenty-first century.

Appendix

Members of the audience were invited to ask questions at the end of the Forum presentations. The questions asked are included in this appendix, followed by the responses given by identified panelists.

Q: From my experience—I've worked seven years in a library, more than that in a computer center, and now I've worked in telephone and media—it seems to me that the cultures of those different functions within the campus are so diverse in many ways. Could you comment on that in terms of being a barrier to some of what we're trying to do?

West: I think that's a very astute observation and I would suggest that if you are a czar and fear assassination you use the inch-up approach. You don't move very quickly. For example, I do have responsibility for library affairs, but library affairs is not amalgamated into computing and communications resources. They are an equal, separate, stand-alone partner and in effect I have two bosses as a result of that. I report to the executive vice chancellor for all computing and communications resources activities, and to the vice chancellor for academic affairs for all library activities.

Mulhollan: What you say is true, that there are different cultures, particularly when you think about functions such as printing and mail compared to some of the more technically based things. On the other hand, until they start thinking about how they relate to one another, how they support one another, and what the future utility of each may be in the more complicated future, those cultures are not going to change. And while I think you can jawbone decentralized units with those responsibilities in certain respects, I think the most hopeful way of getting them to begin to develop a common culture that contributes to a common end is to locate them in an organization where they of necessity work together.

Q: It seems from what we have heard that the cost of information technology in the case of the decentralized example is significant. Is this because a decentralized approach costs more per student, or does it attract more dollars?

Scott: I think you have to be very careful about numbers and comparisons because it depends tremendously on what you count—what you don't include and what you do include. It also depends on the intensity of the activity, the level of support you are providing. It also depends on what is in the institution's budget and what's not. For example, you might buy a lot of computers and include the cost of computers in your tuition rate. The more reasonable number to look at, I think, is the percentage, rather than the absolute number.

Secondly, I think it depends tremendously on the amount of research going on at the institution. Research drives a lot of this, partly because of the sophistication required for the research itself and partly because of the trickle-down effect between research and advanced instruction and more elementary instruction.

The third thing has to do with the scale. One of the reasons Harvard is an expensive institution is that we are in a large number of fields and do not have a lot of students in any one of those fields. For example, in medicine, we have a relatively large medical school which has 160 students in each of the four years. That's about 650 students. And the budget of the institution is $150,000,000. You know that's a very large "per"!

Mulhollan: A lot of those per-student costs depend largely on how much money you have, too. You go back and look at the numbers. Harvard's got 17,000 students, and so does WSU. Harvard's budget is a billion dollars, ours is $150,000,000. I suggest that ours is more typical of most of yours than Harvard's. And that says something about the comparability. They can do things clearly that you can't do if your resources limit the alternatives you have to choose among. There is an element of simple resource availability that dictates or influences how you come out on how you manage some of the resources that you do preside over.

One of the aspects of a model such as Harvard's where so much of their expenditures derives from direct charges against outside funding is the conclusion or assumption that those kinds of outside resources will continue in

such a way to provide for the appropriate replacement and modernization at the time those become necessary. An institution like Harvard can make that assumption with only a modest extent of risk, while a typical state institution of modest size makes those assumptions with a fair amount of risk attached.

Q: To what extent have you been successful in getting life-cycle costs into your programs?

Scott: That for us at Harvard is a very big deal. We work very hard to make sure we put the full cost of activities into operating budgets so that we don't kid ourselves about decisions in the short run, and so that once we have made a decision to put something into the budget it can stay there in the long run. In the administrative end, for example, if we put in a new human resources payroll system that costs us, for the sake of argument, a million dollars, we don't provide that million dollars in our budget in one year. We take out a mortgage on the system for its expected useful life and we put the repayment for that in the budget, so that at the end of the system's life, the money is in the budget. If we don't need to replace the system, we've got a savings, we can do something else. But if we need to redo it, we've got the money there. A number of our departments even do that in constant dollar terms.

West: In the way of contrast to that, being in an institution similar to Paige's, we have done very much the same thing. We are not at full funding, but we have instituted a student access computing formula that is predicated on a life cycle of five years and that does have a built-in replacement capital cost. And we're doing that in faculty as well as administrative as well as telecommunications, in terms of the projects we have going.

Q: I'm curious about departments that overspend at Harvard. Do you have deficit financing?

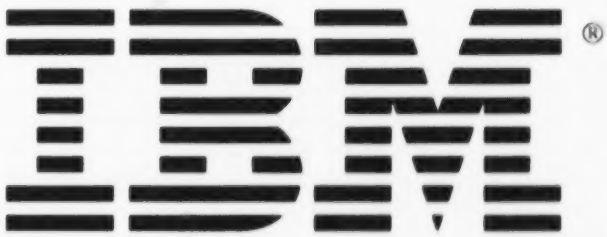
Scott: The most important thing about any management system is establishing the objectives, control, and incentives. The way we handle overspending is with incentives, that is, a department at Harvard that makes a profit keeps it, and a department that makes a loss keeps it. What that means is that if a department has a loss one year, they borrow money from Harvard with interest and they are expected within the next budget cycle to make a plan to repay that. Our board won't approve a budget that is out of balance unless there's an awfully good reason, e.g., a department is planning to lose money for two years as it develops a new area and it's going to balance it over four or five years. But we don't like people who run unplanned deficits. They suffer as does the czar.

Q: Are there special problems in getting academic and administrative people on campus to work together? How do you achieve that?

Mulhollan: That's a traditional argument that is being overrun by events, as for that matter is the centralized vs. decentralized management discussion. In tradition with a sizable number of institutions organized with two separate academic and administrative computer centers, they obviously develop their own culture, their own goals, their own imperial desires, but the necessities for the modern circumstances—resource allocations, development of technology, and the rapid changeability of technology—are simply making a disagreement or uncoordinated effort between those two areas impossible. So while there will be some bruised egos from time to time, I think the people who are genuine professionals who run those areas—as I think most of you in this room are—understand the necessity for such cooperation, and given the opportunity to do it respond very creatively and very cooperatively. At least in two institutions where I had the experience of putting those two things together for the first time, very few problems resulted.

Scott: I'd say at Harvard it depends on the degree of commonality of interest. There is a great deal of cooperation between academic and administrative types, for example, in designing the new communications infrastructure for the institution as the interests are very common. Similarly, from the point of view of the kind of products we're going to need, how we're going to provide software, etc. Where the commonality isn't as great, the cooperation isn't as great. But I think the number of commonalities is growing and the number of differences is shrinking—the problem is still there but in fewer areas.

West: For our institution, there are distinct advantages at this time, having been poor in this area. Since computing started in the California system twenty-five years ago, computing has always been treated as a consolidated entity—one staff, one computer center—and we don't have that problem.



Involvement in Higher Education

Since its earliest years, IBM has supported colleges and universities through contributions of dollars and equipment. These contributions are intended to encourage excellence and creativity, to help higher education attract and retain faculty, conduct research, initiate new and leading-edge curricula, and provide key computing and technological support.

Over the five-year period from 1982 through 1987, IBM donated over $525 million in cash and equipment to colleges and universities. The corporation has also participated with schools in collaborative research projects, on specific technical subjects, totaling $290 million during the same period.

IBM also provides resources through involvement of its people. In the 1987-1988 school year, 89 IBM employees were involved in the IBM Faculty Loan Program. It supports undergraduate programs in many fields for students with special needs, such as minorities, women, and the handicapped. And, for 25 years, IBM has provided financial assistance to faculty of United Negro College Fund-supported institutions.

IBM's commitment to higher education expands beyond research and academia to address administrative computing needs, making it a participant in the total campus environment. As the leading supplier of computing hardware to school administrations, it recognizes that higher education, faced with ever increasing costs and changing enrollments, must strive to make most efficient use of its physical, capital, and intellectual assets. Computing and technology are part of the solution. Improved scheduling and enrollment, campus networking, on-line office and administration systems, and accurate and timely completion of academic and administrative information processing reduce operating costs while enhancing the institution's ability to attract top faculty and students. IBM is proud to be a partner in this critical effort.

In 1983, IBM formed Academic Information Systems (ACIS) to be the corporate focal point in higher education, and to provide leadership in computing in the areas of research, instruction, and academic and administrative support. ACIS's role is: to broaden IBM's technological and product presence on campus and in all departments and disciplines; to strengthen IBM's reputation as a preferred vendor by providing advanced technology and products; and to provide the leading products, support, and service to higher education.

Products and Services

Product Solutions—An example of IBM's focus on administrative computing is the recently-announced IBM Application System/400 (AS/400). With its advanced capabilities, and a variety of applications solutions, the AS/400 can help campus administrators stay competitive, improve services, streamline administrative tasks, and expand to meet changing information system needs. The AS/400 offers:

- ▲ the ability to implement a wide range of easy-to-use administrative applications, including many designed by colleges, universities, and other software vendors
- ▲ an exceptionally productive application development environment
- ▲ easy migration from the IBM System/36 and System/38
- ▲ growth potential to handle future needs
- ▲ a state-of-the-art relational data base integrated into the operating system
- ▲ superior connectivity between the IBM personal computer and the AS/400

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Also serving the general needs of the academic institution is the Laureate Series. This family of products is designed to enhance IBM's connectivity offerings for the school environment. The new offerings support the S/370 architecture, the IBM Token-Ring, the IBM personal computer network, and the IBM personal computer and PS/2 family through networking applications that use the Transmission Control Protocol/Internet Protocol (TCP/IP) in a multi-vendor environment.

Other available products and programs include a series of Office Systems application solutions strategically positioned to link campus computing with the office system. Through this melding of traditional office tasks with the power of mainframe computing and data storage, the office workstation is now capable of participating in a wider and more effective menu of tasks.

Recent Activity

Business Partners—IBM has entered into a cooperative marketing agreement with several software organizations designated as Industry Applications Specialists (IAS) and industry remarketers (IR). These partners provide sales, installation, and application support on a regional or national level. Most install their own software, thus covering application niches for which IBM does not have application solutions. The current list of partners includes:

- NOTIS (library systems)
  Evanston, IL
- Dynix (library systems)
  Provo, UT
- IA—Information Associates
  Rochester, NY
- SCT—Systems & Computing Technology
  Malvern, PA
- Champlain Software
  Burlington, VT
- Kirkwood Community College
  Cedar Rapids, IA
- CMDS—Computer Management and Development Systems
  Harrisonburg, VA
- AMS—American Management Systems
  Arlington, VA
- Concept Systems (bookstore and food services)
  Philadelphia, PA
- Paciolan Systems (athletics system)
  Long Beach, CA

Cooperative Studies—IBM and Information Associates, an IBM Industry Applications Specialist, are working in cooperation with the California State University System to implement DataBase2 (DB2) software into the Information Associates application programs.

A study is currently under way between IBM and the National Association of College and University Business Officers (NACUBO) to analyze and enhance the ability of the IBM AS/400 in addressing the needs of university business officers.

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For more information about IBM, its products, services, and programs, contact your local IBM office, or write to:

IBM ACIS
Manager, General Application Marketing
472 Wheelers Farms Road
Milford, Connecticut 06460

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